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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/559,145	05/05/2006	Darren Hogg	PH0337	9067
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GE HEALTHCARE, INC.				
IP DEPARTMENT				
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PRINCETON, NJ 08540-6231				
EXAMINER				
MALEVIC, DJURA				
ART UNIT		PAPER NUMBER		
2884				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/559,145

Applicant(s)

HOGG ET AL.

Examiner

DJURA MALEVIC

Art Unit

2884

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 May 2008.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-23 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 05 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-8508)
4) ☐ Interview Summary (PTO-413)
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____
Paper No(s)/Mail Date _____

DETAILED ACTION

Response to Amendment

The amendment filed 05/28/2008 was entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 5 - 13 and 16 - 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shao et al. (US Patent 6,008,493) in view of Badawi et al. (Algorithms for calculating detector efficiency normalization coefficients for true coincidences in 3D PET, Phys. Med. Biol. 43 (1998) 189 - 205).

With regards to claims 1, 2, 12, 13 and 23, Shao discloses a method of generating detector efficiency data for a positron emission tomography scanner including: a detector array (Col. 5, Line 18) for generating detection data; and a single photon source (Col. 5, Line 58), wherein the method comprises the steps of: conducting an acquisition procedure using the single photon source to produce detection data (Col. 5, Line 58); and processing said detection data. Shao fails to expressly disclose an efficiency estimation algorithm to calculate data representative of the efficiencies of individual detectors in said array. Badawi teaches algorithms for calculating detector efficiency during blank scans (Introduction). Thus, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Shao to

include the teachings of Badawi in order to obtain a full set of normalization coefficients for statistical accuracy. Note, it is further obvious that computer software controls said algorithms.

With regards to claims 5 and 16, Shao discloses the claimed invention according to claims 1 and 16, absent some degree of criticality, the recitation of the scanner is a non-rotating scanner is considered an obvious matter of design choice involving only routine skill in the art. For example, one skilled in the art would include a non-rotating scanner if the application were to be implemented in an Exact3D Pet apparatus.

With regards to claims 6 and 17, Shao discloses the scanner is a rotating scanner (Col. 6, Line 11).

With regards to claims 7 and 18, Shao discloses the scanner comprises two single photon sources 30A & 31A (Col. 7, Line 15) and the method further comprises the step of selectively operating one of the two single photon sources during the conducting step (Col. 7, Line 64).

With regards to claims 8 and 19, Badawi discloses obtaining estimates for all efficiencies for all detectors (2.3 Algorithms for calculation of intrinsic efficiencies), thus the step of and generating an output (inherent to said method), responsive to said data representative of efficiencies, on an output device for an operator (specifically, middle of page 192).

With regards to claims 9 and 20, Badawi discloses processing said data representative of efficiencies to identify detector elements, or groups of detector elements having relatively low efficiencies. Although, Badawi fails to expressly say "low

efficiencies", it is obvious that Badawis' disclosure of crystal efficiencies would also include corrections of said low efficiencies since variations in the efficiencies may be invalid (See Badawi, 2.3 Algorithms for calculation of intrinsic efficiencies, Page 192).

With regards to claims 10 and 21, Badawi discloses processing said data representative of efficiencies using a function determining a parameter relating to an average over a plurality of detector elements (2.2 Implementation of the geometric corrections [4], Page 191 - 192).

With regards to claims 11 and 22, Badawi discloses processing said data representative of efficiencies using a function determining a parameter relating to an amount of variation therein (2.1 Normalization model, Page 190 - 191).

Claim 3, 4, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shao and Badawi in view of Gregan et al. (US Patent 6,198,104).

With regards to claims 3 and 14, Shao modified discloses the claimed invention according to claims 1 and 12, but fails to expressly disclose producing artificial coincidence count data during an acquisition and wherein the step of processing said detection data comprises processing said artificial coincidence count data. Gregan teaches the artificial coincidences and processing said artificial coincidence as claimed (Abstract, Col. 7, Lines 17 – 50). Thus, it would have been obvious to a person of ordinary skill in the art to modify Shao to include the teachings of Gregan in order to correct the PET images.

With regards to claims 4 and 15, Shao modified discloses the claimed invention according to claims 3 and 14, but fails to expressly disclose that measured counts of

artificially coincident pairs is related to a weighted sum of there individual efficiencies. However, weighting said coincident pairs is well known and conventional used in the art. Thus, it would have been obvious to a person of ordinary skill in the art to relate the said coincident pairs to a weighed sum of individual efficiencies since the weighted sum would increase the accuracy of the correction.

Response to Arguments

Applicant's arguments filed 05/28/2008 have been fully considered but they are not persuasive.

In response to applicant's argument that Badawi is related to using a positron emission source, rather than using a single photon source as claimed in the present invention, thus using the wrong model for a single photon source, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

In this instance, Badawi calculates intrinsic detector efficiency by use of an algorithm and one of ordinary skill in the art would have recognized that efficiency algorithms would be useful in Shao, i.e., normalization processes. One skilled in the art can appreciate that algorithms are well known and conventionally used in the art and modifying Shao is considered routine design choice involving only ordinary skill. Therefore, Shao teaches all elements of independent claim 1, except for the efficient

algorithm. Badawi teaches an efficiency algorithm. Accordingly, the combined teachings of the references would have suggested the recited claim, as explained above for normalization, to those of ordinary skill in the art, thus the rejection is proper.

The examiner directs attention to a previous prior art, which was recited in the conclusion of the previous office action (Vickers, US Patent 5,677,536). Vickers teaches that it is known to automatically normalize detectors for drift, gain and noise. Therefore, Vickers teaches that it is known in the art to normalize for intrinsic effects. The examiner has cited additional art in the conclusion below which may be pertinent to applicant's disclosure.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hines et al. (US Patent 6,100,531) shows a dual-purpose transmission source for use in a nuclear medicine imaging system is described. A Cs-137 point source is used to transmit radiation having a 662 keV photopeak to a corresponding detector during a transmission scan of an object. The Cs-137 source can be used in transmission scans for correcting either coincidence or single-photon emission data for non-uniform attenuation. When performing a transmission scan to correct single-photon emission data, a collimator may remain mounted to the detector, since a substantial portion of the transmitted radiation completely penetrates the radiation-absorbing material of the collimator to reach the detector.

Bailey et al. (Strategies for accurate attenuation correction with single photon transmission measurements in 3D Pet; IEEE 1998; pp 1009-1013) show a PET system benefiting from using a single photon source for correcting attenuation data, similar to independent claim 1.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Djura Malevic whose telephone number is 571.272.5975. The examiner can normally be reached on Monday - Friday between 8:30am and 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2884

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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